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sweet on honey of a berry**

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**New tests by MU
scientists will kill weed
seeds before they
become weeds**

2020 Ag Times

PHOTO BY DAVE MARNER

A FISHER FARMS along Route V south of Owensville, the 2019 Vidal grape harvest was a good one and done mechanically rather than their previous practice of having clubs help with the labor-intensive process. From field to processing into juice that morning, similar father-son operations like those found at Fisher Farms were repeated across Missouri's grape and wine region.

MARCH 11, 2020 PAGE 1B-28B

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IN AN hour and 45 minutes last fall, Keith Fisher and his son, Ryan, had their Vidal grapes mechanically harvested and heading for their destination at White Mule Winery for crushing. Fred Dressel owns the harvester which is run by his father-in-law, Scott (below) talking with Keith Fisher. Previous harvests could take up to 80 man hours or more.

PHOTOS BY DAVE MARNER



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WHITE MULE Winery owner Charlie Schlottach and his son, Gus (right), greet Curt Frolker (left) and Keith Fisher as they arrive to deliver Vidal grapes for crushing during the September 2019 Fisher Farms harvest.

THE FISHERS and friend Curt Frolker (above) head to MFA Agri-Services in Owensville to weigh the Fisher Farms harvest before delivering the grapes to White Mule Winery for crushing starting that day. **RYAN FISHER** leaves the MFA office after collecting weight tickets. Grapes yet to be harvested are covered in a protective netting. **THE HARVESTER** offloads into containers hauled back to the farm off Route V by a small tractor-trailer outfit.



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Saturated soils add flood threat as rain falls and snowpacks melt

BY DUANE DAILEY
University Extension

COLUMBIA, Mo.—Soil moisture, down to subsoil, helps farming, normally. But as winter heads to spring, saturated soils become a concern for Missouri farmers.

“The pressing situation is exceptional wetness across the Missouri River and upper Mississippi River basins,” says Pat Guinan, University of Missouri Extension climatologist, Columbia.

There’s potential impact from spring rains plus melting snows in northern states. Saturated soils won’t hold more water. Rain and snowmelt will run off, heading to Missouri.

A new report from meteorologists in the north-central U.S. raises flooding issues but refrains from firm forecasts, Guinan says.

A 2019 flood repeat isn’t guaranteed, they say. There’s time and factors to come together before they know how bad, or uneventful, it becomes.

Missourians farming along rivers recall last year’s record floods, high rivers and super wet ground. They’ll watch changes from winter to spring across the state this year.

Changes could include dry, warm weather

See **Saturated soils**, Page 5B

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Saturated soils • from page 4B

allowing soils to drain and dry; little or no added snowfall with cold snaps; or a gradual move from winter to spring with mild temperatures making a slow snow melt.

All of those cut flood risks.

However, other possible changes between now and April are not good, the meteorologists report.

Above-normal snowpacks across the basins could grow. A long, widespread cold snap might freeze the ground and build thick layers of river ice. That increases ice jams. Or big rain on snowpack could rapidly release more water.

These changes could delay or prevent crop planting.

Guinan makes no forecast on how spring weather develops. As a climatologist, he says he's better at looking back. Past records help us understand conditions.

December 2019 showed above-normal temperatures during most of the month. State-wide temperature was almost 6 degrees above long-term average. That made it the ninth-warmest December on record.

In the tradition of Missouri's erratic weather, 2019 had six months each of below-normal and above-normal temperatures.

December was the state's driest since 2017, yet Missouri had eight wetter-than-average months during 2019.

January data isn't tallied. It surely won't match December's temperature departures, though it will be above normal.

Average precipitation for the year was 53.78 inches. That makes 2019 the state's seventh-wettest year on record.

Meanwhile, bottomland farmers keep watch on the weather heading into spring. They hope for no topping of 2019 records.

River data for Missouri is at agebb.missouri.edu/weather/river.htm.

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WESLEY CEBULAK, a laborer at White Mule Winery, tends to crushing duties at the start of a continuous 36-hour process to juice the Fisher Farms Vidal crop. Each batch takes an estimated 90 minutes to complete using the two crusher machines. Gus Schlottach (on right, top photo) said their family-owned business can crush a batch using two machines in about 90 minutes. Cebulak estimated they'd need about 36 hours of continuous attention to get the Fisher Farms grapes processed into juice. Containers of grapes are moved into the shade of a machine shed.



PHOTOS BY DAVE MARNER



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Seasonal utility cow price in the Southern Plains, 1997-2006



Can you make cull cows a better profit center?

ALAN NEWPORT
BeefProducer.com

COWCULLING TYPICALLY produces poor returns for many ranches, but it could be made more profitable. It's a matter of weighing your costs versus potential returns, combined with better market timing.

First, it's generally accepted cow sales make up only 10% to 20% of ranch income on most cow-calf operations, despite the fact cows typically make up more than half the livestock inventory. We recently addressed

one remedy for this with the story "Consider the no-depreciation cow-calf operation," still available online at BeefProducer.com.

A further cure for meager cow returns would be better marketing of the open cows typically sold in the fall at preg-check time. One look at the graph in this story should tell us this is a bad financial or marketing decision, if we didn't already know.

A three-year project by the Noble Re-

See **Cull cows**, Page 9B

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Cull cows • from page 8B

search Institute in southern Oklahoma was published earlier in 2019 and showed significant actual profits to be had from keeping open cows in the fall, feeding them and breeding them, then selling as bred cows at a later date.

In brief, they found feeding on weight without adding a pregnancy did not make for a profit when selling cows in the spring in those three years. However, when they sold heavier, bred cows in the spring, about half the time they made a profit, in some cases a significant profit over feed costs. Their average pregnant-cow profit for that three years was \$68 per head.

In this study, Noble Research Institute used a total of 244 open cows from one of its research farms in 2015-16, 2016-17 and 2017-18. At weaning time each fall, all cows were weighed, pregnancy tested via ultrasound, and assigned an initial body condition score by certified beef quality assurance research technicians.

Here's the gist of their management

Economic variable	2015-16		2016-17		2017-18	
	Thin	Moderate	Thin	Moderate	Thin	Moderate
Market scenario 1: Sell all cows using slaughter cow prices from USDA AMS Market Reports						
Average cow value at weaning (\$/hd)	719.56	886.85	632.98	691.09	691.18	844.34
Total cost (\$/hd)	358.27	241.92	297.48	235.71	246.39	219.50
Sale value in spring (\$/hd)	918.51	919.78	825.47	832.34	770.61	781.40
Net return (\$/hd)	-159.32	-208.99	-104.99	-94.46	-166.96	-282.44
Market scenario 2: Sell Year 1 bred cattle < 6 years of age via video auction; sell all other bred and open cows at Oklahoma City National Stockyards						
Average cow value at weaning (\$/hd)	719.56	886.85	632.98	691.09	691.18	844.34
Breeding bull cost (\$/hd)	28.27	10.80	13.28	11.70	25.99	15.99
Pregnancy test (\$/hd)	6.00	6.00	6.92	6.92	6.73	6.73
Total cost (\$/hd)	392.99	258.95	318.01	254.63	279.42	242.43
Sale value in spring (\$/hd)	1509.92	1433.76	861.90	971.13	940.16	909.55
Net return (\$/hd)	397.37	287.96	-89.09	25.41	-30.44	-177.22

and record keeping. Using body condition scores, the open cows were sorted into two management groups:

- A "thin" group with BCS less than 5.5
- A "moderate" group with BCS greater than or equal to 5.5

Each month through the end of the cow-retention period, cows in both groups were weighed and given a BCS. At weaning time and at the end of the retaining period, the USDA cow grader traveled to the study site and placed a dressing percentage and USDA grade on every cow: lo-lean, lean, boning utility, breaker.

Feed rations were developed for both

groups to improve the condition of all cows to a target BCS of 6. The ration for the thin group included a mixture of ground hay (60% alfalfa and 40% grass) fed at rate of 20 pounds per head per day, plus 9.5 pounds of corn per head per day, and fed seven days a week. The ration for the moderate cows included the same mixture of ground hay, plus 1.5 pounds per head per day of 32% protein cubes fed three days per week.

Two rested breeding bulls were assigned to each group of cows each year for a 60-day breeding season in an attempt to rebreed the open cows. Each year, bulls were given a breeding soundness exam before turnout on

Dec. 1. At the end of each trial in each year, all cows were again pregnancy tested with ultrasound. All cows that tested open were subjected to a secondary blood test to confirm it.

If you'll look at the chart of the Noble researchers' data, you'll see their cow profits declining over the three years as the marketplace moved into the very flat cow market we're now seeing. This is one of the realities of cow marketing.

You also should notice the feed costs per cow and determine whether your costs for putting on weight would be more, the same, or less. The Noble research crew also noted the returns from selling younger bred cows were greater than selling older bred cows, which should not be news to anyone familiar with cow marketing. They also noted the financial advantage of selling cows in truckload lots, when possible.

The full story is available on the Noble Institute's News and Views from September 2019: bit.ly/noblecow

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Ragged stand better than no stand

BY LINDA GEIST
University Extension

COLUMBIA, Mo. — In a year of uneven crop emergence, University of Missouri Extension agronomists say not to count out runts that emerge late. “A late-emerging corn plant is better than no corn plant,” says MU Extension agronomist Bill Wiebold.

In a weekly teleconference of MU Extension agronomists on last May, reports varied from “no corn in the ground at all” to 40% planted. Regional agronomists expressed concern about uneven emergence of corn in fields already planted.

Yield loss can happen when smaller plants compete for nutrients and sunlight with larger, earlier-emerging plants. Smaller plants likely produce barren or small ears.

Seeds that emerge 10 days behind their row mates lessen in-row yield potential. Studies vary, but agronomists in Wisconsin and Illinois estimated losses at 8-10% in older research, says MU Extension corn specialist Greg Luce.

The numbers remain relevant, Luce says, even though improved precision-planting

equipment reduces irregularities. Skips and smaller plants are still likely. “Skips are what you don’t want,” he says. “Doubles are a planter issue and certainly not desired, but they don’t have the negative impact on yield like a skip.”

Luce says uneven emergence happens for several reasons: soil crusting, compaction, inconsistent and especially shallow seeding depth, and differences in soil temperature. Seed-to-soil contact matters as well. This year, cool weather provided fewer growing degree units, which are needed for corn to develop strong root systems and emerge uniformly.

“In a perfect world, we would have a picket fence and the world would look beautiful,” Wiebold says. That’s not the case in 2019, when flooding and excessive rain delayed planting and prompted early concerns of replanting.

But most uneven stands do not warrant replanting. “A ragged stand is better than no stand,” Wiebold says.

Luce agrees that replanting is not justified when only due to uneven stands. “Although uniformity is the goal, the most important



CORN FIELD south of MFA in Owensville.


PHOTO BY DAVE MARNER

factor is the total plant population,” he says. “Too many skips and a low plant count is what calls for replanting.”


The MU Extension guide “Corn and Soybean Replant Decisions” is available for

free download at extension2.missouri.edu/g4091, where you can also download MU Extension economist Ray Massey’s updated replant decision-making tool.


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Maintain farmer health like you would farm equipment

BY LINDA GEIST
University Extension

COLUMBIA, Mo. — Farmers know that well-maintained equipment is key to success.

Yet they often do not listen to the “check engine” warning signs of stress, says Sean Brotherson, family science specialist for North Dakota State University. Brotherson was the keynote speaker at the recent University of Missouri Crop Management Conference.

“Ag has its own rhythms. It has its own culture,” Brotherson said. When those rhythms go awry, stress can result.

“Health is the most important asset to any operation. If it is the most important asset, it also needs to be the most important priority,” he said.

Many sources of stress, such as weather and prices, are beyond the control of farmers. “You are at the mercy of things,” Brotherson said.

Research from the U.S. Occupational Safety and Health Administration ranks farming as one of the top 10 stressful occupations. The U.S. Centers for Disease Control and Prevention reports that the suicide rate for farmers is 1.5 times the national average.

MU Extension farm health and safety specialist Karen Funkenbusch said that in 2019 farmers faced flood, rains, late planting and uncertainty about commodity prices. Issues beyond a farmer’s control can weigh heavily and lead to depression, anxiety and suicide even in a typical farm season, Funkenbusch said. Debt, illness and injury also



add to pressures.

“Farmers, because of their strong and independent nature, often are reluctant to talk about these issues,” she said. “Fortunately, resources are available. If you need help or know of someone who needs help, reach out.”

Funkenbusch leads the Missouri AgrAbility Project, an MU Extension program that works with partner organizations to provide practical education and direct assistance that promotes rural independence.

Funkenbusch offers these suggestions for farmers, ranchers and their families:

- Know the warning signs of stress. Physical signs include headaches, aches of the back and neck muscles, fatigue, labored breathing, weight gain, rising blood pressure, sweating, stomach issues, and sweating. Emotional signs include anger, restlessness, irritability, inability to sleep and relax, increased alcohol or drug use, and withdrawal from other people.

- Slow down.
- Get a physical checkup.
- Seek local resources, including clergy and medical professionals. Talk with other farm families and neighbors.
- Exercise daily. Take regular breaks throughout the day.

Additional resources:

- Missouri AgrAbility Project, AgrAbility.missouri.edu.
- MU Extension Show-Me Strong Farm Families, on Facebook at [ShowMeStrongFarmFamilies](https://www.facebook.com/ShowMeStrongFarmFamilies).
- MU Extension Mental Health First Aid classes help people learn to identify, understand and respond to signs of mental illnesses and substance use disorders in communities. See Health and wellness on the MU Extension website for related information and resources.
- Farm and Ranch Stress, North Dakota State University, www.ag.ndsu.edu/farmranchstress.
- National Suicide Prevention Lifeline, 1-800-273-8255. Contact Funkenbusch at FunkenbuschK@missouri.edu or AgrAbility@missouri.edu.



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Missouri growers are sweet on honey of a berry

BY LINDA GEIST
University Extension

ELKLAND, Mo. —Blueberry is singing the blues. There's a new berry in town.

Berry lovers might say "pretty is as pretty does" applies to the flavorful honeyberry. Easy-growing and easygoing, it grows well in a variety of soils, sun and shade. It resists disease and pests.

University of Missouri Extension horticulture specialist Patrick Byers says southwestern Missouri's rocky soil is perfect for honeyberry. Farmers in other states found that honeyberry plants long and strong, with a 50-year life expectancy and the ability to withstand temperatures as low as minus 55 degrees.

The purple-blue, teardrop-shaped berries are half an inch to an inch long. They are the first to bear in spring, even before strawberries.

Honeyberry goes by haskap in Japan and zimolost in Russia.

B Berry Farms, a U-pick operation in Elkland, Mo., sells 20 different varieties of honeyberry. B Berry also grows a variety of other fruits, including blackberries, raspber-



THE OWNERS of B Berry Farms in Elkland, Mo., began growing honeyberries and other fresh fruits and vegetables for their family. They now operate a U-pick farm with a variety of fruits and vegetables, and value-added products such as soaps and lotions.

PHOTO COURTESY OF PATRICK BYERS.

ries and Goji berries, as well as vegetables. Value-added products include soaps, balms and lotions.

Farm owners Brandon and Teresa—they want their customers to know them on a first-name-only basis—started growing berries for themselves and their children. They now grow up to 4,500 plants on their

Webster County farm.

"We wanted more control over how fresh our food was and where it came from," says Teresa. "That started our journey looking for local food choices."

When they decided to add honeyberries to their operation in 2015, they cleared rocks, cedar trees and briars from the rocky, clay

soil to make way for berry patches. They applied sulfur and peat moss for blueberries the following year.

When they planted 3-year-old honeyberry bushes, they immediately saw some advantages over blueberries. Honeyberry bushes flower earlier than blueberry plants, and the early-ripening, thick-skinned fruit is less vulnerable to spotted wing drosophila. The berries grow under the leaves, protecting them from birds, rain and hail.

"We also found that they can thrive in soggy, oxygen-deprived soil," Teresa says. "Despite being covered in weeds without much sunlight, the plant will still flourish, unlike other berries."

Honeyberry also tolerates a wide range of soil pH. Brandon and Teresa say the plants did well in soil pH of 5-8, and sometimes even outside that range. They require little maintenance.

Teresa says honeyberries have antioxidants and potassium levels nearly three times higher than blueberries.

Brandon and Teresa use the farm's produce in hundreds of value-added products

See **Honeyberry**, Page 13B

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HONEYBERRY BUSHES bear their teardrop-shaped fruit early in the spring, even before strawberry.

PHOTO COURTESY OF PATRICK BYERS

Honeyberry • from page 12B

such as lip balms, tea blends and natural dyes. In addition to running the farm, they both work full-time jobs off-farm.

“We knew there would be many unknown challenges ahead for our family, but isn’t that what life is about—just doing what needs to be done?” Teresa says. “Since we opened,

we have enjoyed being able to bring friends and families together to a place where their children can run around, enjoy nature and have fun eating a healthy treat.”

Learn more about the farm at bberry-farms.com.

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DRY CONDITIONS across much of Gasconade County in September gave area farmers like Jamie Decker the opportunity to get many fields cleared by the middle of the month. Wrap sy



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PHOTO BY DAVE MARNER

systems for hay bales and silage are visible in the foreground — a method growing in popularity.

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OWENSVILLE AREA farm Cody Sassmann harvests soybeans off of Route Y near Meyer Road across from MFA Agri-Services in October 2019.

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PHOTOS BY DAVE MARNER

A soybean Saturday afternoon

Rick Peth runs a grain hopper alongside Cody Sassmann's combine during a Saturday soybean harvest in mid-October 2019. The beans were being trucked to market by a contracted hauler. Running off-loads orchestrated by Peth and Sassmann (below) made efficient use of their perfect weather conditions. The lighting was pretty nice for photography as well. Conditions over the spring, summer and fall in the Missouri River bottoms, however, were not as conducive for farming operations. Ongoing flooding from March to December left thousands of acres across Missouri unplanted entirely, or planted and flooded out several times. The blue hole along Highway 19 north of Hermann was filled with floodwater again which left nearby fields with either remnants of earlier plantings or repeated attempts to get a crop planted.



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The benefits of native grasses

ELIZABETH STEELE

GREEN IN ALL SEASONS

Tales of an old timer have it that the glades of the Ozarks (native grasslands growing where bedrock is at or near the soil surface), grew grass year-round for livestock and wild-life. The old timer continued that there was no need to feed hay in winter because there was always something green. How can this be when the native grasslands are so well known for their summer grass growth and profusion of wildflower blooms?

One of the famous grasses-of-summer is Big Bluestem. As I write this, a touch of snow still remains on the ground and all of the above-ground parts of the Big Bluestem are brown; it is not collecting any sunlight. It will show no signs of life until it sluggishly wakes up sometime in mid to late April. This grass is classified in a group called warm season grasses, and this group contains other well-known grasses of our grasslands (e.g. Indiangrass, Little Bluestem, Switchgrass, Eastern Gama Grass).

The answer to the old timer's mystery

however lies in the fact that there is another class of plants in addition to those grasses-of-summer, known as cool seasons. Take for instance a lesser-known species, Wild Ryes. Peeking out of the snow today is 3-4" of green growth that is actively collecting sunlight. Though it may not be measurably growing aboveground in the snow, it is growing new roots below ground and getting ready for the warmer weather when it will quickly take off and grow.

When both the warm and cool season groups of plants are present, the growing season can be extended from as little as one third of the year to three quarters of the year! This has obvious benefits to both wildlife and livestock: if there are actively growing plants, there is quality forage, and, if the plants are growing nearly year-round, there will be more to eat. In fact, a diversity of plants can produce over 200% more growth than a single high-producing species planted alone.

From the perspective of folks who want to restore a rare and declining habitat (e.g. savanna, glade, prairie) or folks who want to

landscape with native plants, there are also benefits to having plants that grow in each season. It reduces the weed competition (Mother Nature will put something there if you don't), takes more carbon out of the air and puts it in the soil (adding carbon to the soil in the form of organic matter is a good thing for the soil and the plants growing in it), and makes for healthier soils (the microscopic creatures in the soil have a more steady food supply with a diversity of plants).

Diversity is as good as it gets!

The statement that diverse native grasslands can produce over 200% as much forage as a monoculture of Switchgrass is based on very interesting research by David Tilman and others and published in an article titled "Carbon-Negative Biofuels from Low-Input High-Diversity Grassland Biomass", which is found in Science Volume 314 and published in 2006.

Diversity: Roots in All Depths

Years ago I saw a picture of a man standing next to the unearthed root system of an Indiangrass; the root system must have been

twice as tall as the man! "Wow," I thought, "It is no wonder that this grass species does so well in a drought." It can get water that is from 15 feet down in the soil. With that impressive picture in my mind, I continued to think about the advantages this plant has. Not only does it have access to all of that water, but it can get nutrients from that deep as well. Interestingly, some plant essential nutrients are either more abundant or more available to the plant in lower horizons (or levels) of the soil. Deep rooted plants often are very steady in their production. Come what may – be it drought or inches and inches of rainfall – these plants will just keep growing at a steady rate. It is a draft horse. Day in, day out, the horse goes to work in the field. He never wins any races for speed, but he can always be found out there getting the job done. Steady and reliable...it could be the motto of the draft horse and the deep rooted natives.

As I contemplated this, it occurred to me that if all of the plants in the field have deep

See **Native grasses**, Page 20B

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Novel camera system could provide cost-effective way to monitor crop temperatures, MU researchers find

COLUMBIA, Mo. — A hot plant is an early warning sign of an under-watered, unhealthy plant, which makes monitoring crop temperatures a priority for many farmers. But to do so, they need the right equipment. Infrared cameras can detect heat and convert it into an image, but they are large, unwieldy and expensive. Infrared sensors are less expensive, but they don't provide images, which makes accurate monitoring difficult for medium and large-sized fields.

Now, researchers from the University of Missouri and the USDA's Agricultural Research Service have developed a novel approach that can provide precise, visual crop temperature data at a lower cost. Combining a regular digital camera with a miniature infrared camera into a specially engineered structure, the system can provide both temperature data and detailed images, giving farmers a large amount of information about their crops.

"Using an infrared camera to monitor crop temperature can be tricky because it is difficult to differentiate between the plants and background elements like soil or shade," said Ken Sudduth, a USDA agricultural engineer and adjunct professor of bioengineering at MU's College of Agriculture, Food and Natural Resources. "By augmenting a miniature infrared camera with a digital camera, we created a system that can examine crop temperatures with great detail and accuracy."

Sudduth developed the camera system with Philip Drew, a graduate student researcher who completed his master's degree at MU while working on the project. Together, the cameras produce two distinct images of the same area: a visually detailed photograph and an infrared image. The setup, known as the Multi-band System for Imaging of a Crop Canopy, allows farmers to identify problem areas from the digital camera images and analyze those areas with infrared images that map temperature to light intensity.

Coupled with an algorithm that automatically filters soil, shade and other non-plant presences from the images, the camera system would allow farmers to precisely irrigate their crops according to the specific needs of individual plants, maximizing yields and optimizing water use without requiring the purchase of more expensive infrared cameras.

"Medium-scale farmers have big fields, but they don't always have the funds for expensive monitoring equipment," Sudduth said. "Our system allows for precision monitoring over a large area for a more manageable cost. That's good for farmers who can earn a bigger profit, and it's good for everyone who depends on their crops."

Sudduth said the system needs more fine-tuning before it can be sold to farmers, and future iterations could incorporate drones for increased versatility.

The study, "Development of a multi-band sensor for crop temperature measurement," was published in *Computers and Electronics in Agriculture*. Allen Thompson of MU and John Sadler of the USDA Agricultural Research Service were also involved in the study.

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Survival of flooded crops depends on time, temperature

BY LINDA GEIST
University Extension

COLUMBIA, Mo. – “It’s raining, it’s pouring, the old man is snoring” is a child’s chant that rings far too true for Missouri farmers today.

Many Missouri field crops face fallout from flooding and excessive rain, says University of Missouri Extension corn and small grains specialist Greg Luce.

Survival of flooded corn and soybean seedlings depends on how long the flood lasts, floodwater temperatures and how fast fields dry, Luce says.

Flooded plants deplete oxygen in 24 to 48 hours. Moving water, which allows some oxygen to get to plants, results in less damage than still water, he says. Young plants can survive about two days when temperatures exceed 70 F. When temperatures fall to the mid-60s or below, they can survive as long as four days. Survival also depends on how much of the plant is submerged.

Plants should show new leaf development three to five



days after water recedes, says Luce. Examine seedlings for disease. Look for rotted or discolored seedlings, roots and damping-off symptoms. (See the recent MU Integrated Pest & Crop Management newsletter article “Stand loss due to seedling disease” at ipm.missouri.edu/IPCM/2019/5/seedlingDisease.)

Generally, soybean tolerate flooding longer than corn—up to 48 hours. After 48 hours, expect stand reduction, loss of vigor and lower yield. Root damage also occurs. This

impairs the plant’s ability to take up water and tolerate drought stress.

Abnormally high temperatures reduce survivability by 50% or more. Plants survive better in lower temperatures because metabolic processes slow.

Flooded plants also can face disease pressure. Cool, wet fields create favorable conditions for soil pathogens. They also delay plant development and growth. This puts some plants at greater risk of soil-borne diseases that attack seeds and seedlings.

Seed treatments can help prevent diseases, but they typically only provide protection for a couple of weeks under cool, wet conditions.

If these conditions persist longer than that, crop stands are at risk from Pythium, a parasitic disease that damages seedlings of soybean and corn. Phytophthora also can damage soybean seedlings or start infections in the early summer that may develop and kill soybean plants later in the summer.

Native grasses • from page 21B

root systems, then the next door neighbor also has a deep root system and is a direct competitor. It would be better to have root systems of neighboring plants that are different so they can collect water and nutrients from different areas of the soil. Shallow rooted plants have their place. In fact, shallow rooted species tend to be more like racehorses. They respond to moisture rapidly and convert it to growth. However, after the race or when the drought comes, they shut down and quit. They react in a similar fashion to fertility. Whether the fertility comes in the form of dung and urine from wildlife and livestock, the ashes of a fire, nutrients that are recycled from dead plant material or a fertilizer truck the shallow-rooted plants quickly take advantage of these newly found nutrients. The motto of the racehorse and the shallow rooted plants is that when conditions are good, go fast and furious, but otherwise stand and watch the world go by. Many native cool season plants have shallow root systems and consequently respond quickly to the usually abundant rainfall in spring and fall.

In all of the time in the last 30 years that we have spent time on the native grasslands, we have observed that there are dramatic ebbs and flows in the production of everything from leaves to blooms and seeds depending upon the type of root system. From the perspective of folks interested in using native plants for forage, diversity means that the available water and nutrients are most efficiently used to produce the most forage possible. From a wildlife viewpoint the diversity of root systems means that regardless of the soil water and nutrient conditions, there will be blooms for nectar, seeds for food, plant leaves and other parts

for consumption by not only wildlife but also insects that many species of wildlife eat; sometimes the deep rooted plants will be the major producers and at other times the shallow rooted plants will take advantage of the situation to produce the food and habitat. Landscapers can find that a mix of deep and shallow rooted plants will be more likely to provide blooms year in and year out. And, lastly, the folks interested in restoration find that the diversity of root systems is in the design of our native grasslands, and it is a great blueprint to replicate.

Native grasslands have an amazing diversity of root systems: deep vs. shallow, fibrous and spreading vs. tap rooted and penetrating. This diversity lends resiliency to the native grasslands; they can withstand and even thrive following a variety of disturbances. Diversity is as good as it gets!

The Benefits of Grass Diversity

Why is it that when we think of native grasses we only think of the warm season grasses like Big Bluestem, Switchgrass, Eastern Gama Grass, and Indiangrass? There is a rich diversity of native grasses beyond these basic grasses, and including a diversity of grasses has huge benefits, especially when species from different functional diversity groups (i.e. native warm season grasses, native cool season grasses) are included. A diversity of grasses is better for wildlife, soil health, and even forage production.

Soil Health: A very important principal of soil health is diversity. A diversity of plants begets a healthy and diverse assemblage of soil life; these little critters make the glue that holds the soil together, are the recycling center that converts dead plants into nutrients

for other plants to use, and an important mediator in the creation of soil organic matter which makes for rich and productive soils that store carbon dioxide. The addition of one grass to the mix is beneficial to soil health, but the inclusion of multiple grasses is even better because each grass species has its own unique suite of microbes associated with it. A second principle of soil health is to have a green, growing plant all year long because the roots of these plants then provide a year-round food source for the microbes. If, say, Big Bluestem is the only grass in a planting, green grass is confined to only the warm, summer months. However, the addition of a cool season grass means that there is green grass, and consequently operational roots and happy microbes nearly year-round. And why stop at two species? Each grass species is unique in its growth period; repeatedly we see a certain grass, and think, “Wow, look at the green growth on that beauty,” but in a different year or a different landscape position a different species will catch our eye. At these times, we remind ourselves that no species is the total package, diversity is the answer.

Wildlife: Surely wildlife doesn’t care about grass diversity, does it? We think so. Some grasses produce a nice, meaty seed for birds to eat while others don’t. Some are a larval food for certain butterflies or other insects while others don’t serve this function. Some grasses stand straight and tall, which provides verticality and protection from aerial predators (what raptor wants to risk its eyes or wings near a spiky Wild Rye plant?). Meanwhile others have a softer texture and their leaves fountain over, which creates an excellent hiding spot (who wouldn’t want to hide under the umbrella of

a Prairie Dropseed?). Because each grass is unique in its contribution to wildlife habitat, a diversity of grasses will yield a higher diversity of wildlife. Grass diversity also creates a stronger, more stable habitat.

Livestock Forage: If forage production is a consideration, grass diversity will even out production between years. Let’s take our favorite grass plant – maybe Eastern Gama Grass. A certain set of environmental conditions and management will really cause this grass to produce some years. However other conditions result in less stellar performance. Each grass has its unique list of perfect growing conditions, and what is good for one may not be best for the next. Diversifying the grass species, in effect, stabilizes the forage production in drought years and wet years and hot years and cold years and even the average years. An additional advantage of diversity is the increased forage production as compared to a monoculture. Because each grass is unique, diversity lengthens the season of growth (especially when native warm and native cool seasons are both included), results in more efficient root architecture (shallow rooted plants next door to deep rooted plants), and diversity is better able to respond to disturbances such as drought. The sum of all the grasses together is greater than the single best species.

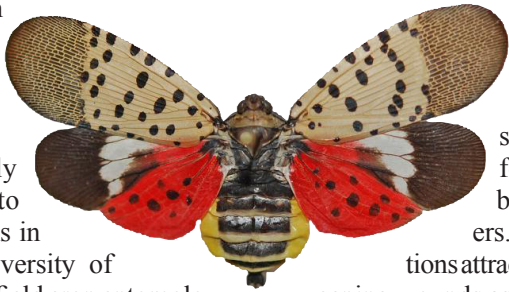
Elizabeth Steele writes blogs for Hamilton Native Outpost, her family’s native grass and wildflower company, as well as managing seed inventories. Hamilton Native Outpost loves sharing about native plants for agriculture and natural resource management.

Hitchhiking spotted lanternfly could become problem in Missouri

BY LINDA GEIST
University Extension

COLUMBIA, Mo. — An exotic pest that hitchhikes on train cars, trucks and boats could suck the life out Missouri crops.

Spotted lanternfly has the potential to establish populations in Missouri, says University of Missouri Extension field crop entomologist Kevin Rice. It damages soybean, corn and hops, as well as fruit and ornamental trees. According to MU Extension viticulturist Dean Volenberg, it could have damaging effects on Missouri's 1,700 acres of grapes, its primary host.



SPOTTED LANTERNFLY PHOTO COURTESY PENN STATE EXTENSION

Adult lanternflies are active in June and July. Entomologists reported seeing the spotted lanternfly in Pennsylvania in 2014. It has appeared since then in Virginia, Delaware and New York.

The plant hopper likes to lay its eggs on smooth, metal surfaces such as those found on train cars, boats and tractor-trailers. Its honeydew secretions attract other pests. It leaves weeping wounds as it feeds.

The adult lanternfly's forewing is gray with black spots. The wingtips are black blocks outlined in gray. It has distinctive bright orange-red and white underwings,

See **Spotted lanternfly**, Page 23B



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MU research targets Japanese beetles

BY LINDA GEIST
University Extension

COLUMBIA, Mo. — Japanese beetles—those mean, green eating machines—are peaking throughout much of Missouri.

University of Missouri Extension field crops entomologist Kevin Rice hopes his research on Japanese beetles will take a bite out of their buffet.

Japanese beetles cause large economic losses for the agricultural community. Adult beetles typically feed on silks and tassels in corn and foliage on soybean. They also damage the foliage and fruit of more than 400 flower, shrub and tree species.

Currently, pyrethroids are the best knock-down control measure for them, says Rice. Apply chemical control when thresholds are met. The beetles move quickly from nearby woods, fields and lawns to re-infest an area, so multiple applications might be necessary.

Rice and his team of MU graduate students are researching the use of nets containing pyrethroids to control Japanese beetles. They place nets and pheromone lures around field borders. Previous researchers found that beetles pick up a toxic dose

within three seconds. The nets remain effective throughout the growing season and are unlikely to attract pollinators.

“It’s not a silver bullet,” Rice says, “but it’s a bullet.”

Japanese beetles are in peak season in Missouri now. Rice recommends chemical control when economic thresholds are reached. Bags and traps are far less effective and may attract more beetles.

Traps catch about 75 percent of beetles and can actually attract more beetles than they capture, according to the USDA publication “Managing the Japanese Beetle: A Homeowner’s Handbook”.

If you use traps, place them away from plants and on the borders of yards or fields.

Rice says his research is in the preliminary stages and he does not recommend nets yet. He says homeowners and farmers should continue to monitor lawns and fields. Apply chemicals in a timely manner according to label instructions.

The adult Japanese beetle is a little less than half an inch long and has a shiny, metallic-green body with bronze-colored outer wings. The beetle has six tufts of white hair under the edges of its wings. Japanese



UNIVERSITY OF Missouri Extension entomologist Kevin Rice and his team of graduate students research the use of pyrethroid nets to control foliage-eating Japanese beetles. **PHOTO BY JESSI DODGE, MU EXTENSION.**

beetles produce one generation each year and can burrow up to 12 inches below soil in the winter to survive.

other pests at MU’s Integrated Pest Management website.

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Spotted Lanternfly • from page 21B

but it appears less vibrant and may be difficult to see when its wings are not spread, Volenberg says.

It likes fall feeding on *Ailanthus altissima*, also known as tree of heaven, a medium-sized invasive tree with stout branches that spread to form an open, wide crown. Its flowers are showy and fragrant and it tolerates drought. The tree also

enables the ailanthus webworm moth.

What to do if you spot lanternflies

- Do not kill it. The insect contains cantharidin, the same toxic chemical found in the blister beetle.

- Capture it if you can. Lanternflies are jumpers.



WHEN ITS wings are not spread, the spotted lanternfly is fairly unremarkable in its appearance.

PHOTO COURTESY PENNSYLVANIA DEPT. OF AGRICULTURE

- Take a photograph of it. Email to ricekev@missouri.edu.

- Collect a specimen and put it in a vial filled with alcohol to preserve it.

- Take it to your county extension center and note where you found it. GPS coordinates are helpful. The extension center will send it to Rice, who will track its spread in Missouri.

- Use caution when handling

tree of heaven; its sap can cause headaches, nausea and possible heart problems, according to Penn State Extension.

Sign up for free pest alerts from MU Extension's Integrated Pest Management program at ipm.missouri.edu/pestMonitoring.

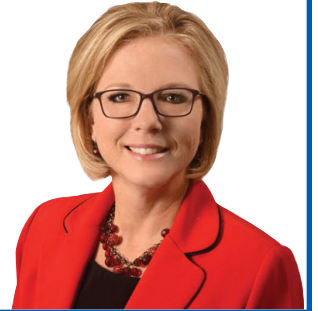


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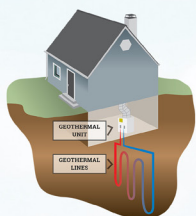
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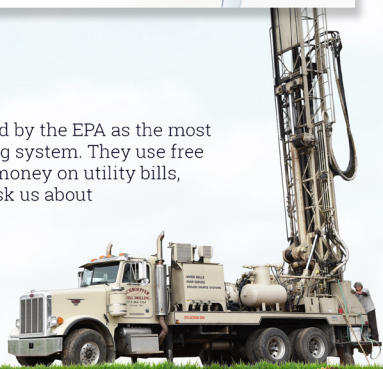


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New tests by MU scientists will kill weed seeds before they become weeds

BY DUANE DAILEY
University Extension

COLUMBIA, Mo. - Kill seeds before they become hard-to-kill weeds. That plan will be studied by Kevin Bradley with help from Missouri farmers.

The University of Missouri Extension weed specialist plans research on crushing seeds before they hit the ground. That stops weeds competing with crops next season. Over time, that depletes soil seed banks.

The task is big. Some herbicide-resistant weeds grow several hundred thousand seeds or more per plant.

At the annual Pest Management Day, July 9 at MU Bradford Research Center near Columbia, Bradley asked soybean farmers to volunteer to help.

Soon to arrive at the MU research farm is a Case IH combine with an attached "seed terminator." The mill grinds seeds to dust. Tests in Australia with a similar system showed more than 90 percent of weed seed was not viable after exiting the terminator.

Bradley wants to test his idea and machine

on weed-infested farm fields in Missouri. He's looking for soybean fields of 50 to 80 acres, preferably no more than 100 miles from Columbia.

Bradley has spent his research career at MU since 2003 studying all kinds of weed controls, including chemicals. But with repeated use of each new herbicide, farmers select more resistant weeds.

If only a few weeds escape control each year, those survivors produce thousands of seeds that farmers contend with in future years.

Bradley recently shifted gears in his research to look for alternative controls for problem weed species.

In addition to the seed terminator machine, Bradley evaluated the impact of windrow burning. Chaff and weed seed left behind the combine is windrowed and burned. The fire kills weed seeds.

Bradley's team conducts research on weed management at the Bradford Research Center as well as other MU research farms around the state.

Farmers wanting to cooperate can contact



Bradley through their regional MU Extension agronomist. There is an MU Extension office in every county.

Pest Management Day visitors riding bleacher wagons see only a small part of that work. After lunch, visitors use a guidebook to find other research. Bradley's crew planted

plot signs to help visitors.

For more than 100 years, University of Missouri Extension has extended university-based knowledge beyond the campus into all counties of the state. In doing so, extension has strengthened families, businesses and communities.

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Early-calving heifers are our future

ALAN NEWPORT
BeefProducer.com



I suspect most cow-calf operators have seen the data relating early-calving heifers and cows to bigger calves, earlier-maturing offspring and longevity when defined as ability to

stay in the herd.

A new study from western Canada again reiterates these relationships.

This is valuable information, yet I believe most folks are missing some logical inferences from this data. Primarily, the lesson is these are the most reproductive cows in their environment and management system. These are the future of the herd to replace themselves and produce suitable bulls.

Now that I've given you the punch line to chew on, I'll quickly review the Canadian study, and then we'll continue: The trial used 211 black Angus and Angus-crossbred

heifers from the Western Beef Development Centre in Saskatchewan. This was a spring-calving herd, and the data came from 2001-17. The breeding season began June 20 each year and lasted about 65 days.

The researchers said heifers that calved with their first calf during the first 21-day period of the calving season remained in the herd longer than those that calved in the second 21-day period or later.

They also showed females that calved early as heifers tended to calve earlier throughout the remainder of their productive lives than the females that calved later in their first calving.

This matches results of a study on more than 16,000 females done at the U.S. Meat Animal Research Center in Nebraska.

In the Canadian study, heifers that had their first calf during the first 21-day period of the calving season lasted an average of 7.2 years, versus 6.5 years for second-period

heifers and 6.2 years for third-period calvers.

Average longevity for the USMARC heifers that calved in the first, second or third period was 8.2, 7.6 and 7.2 years, respectively. So, to get back to my point: There is a clear genetic and hormonal difference, and I suspect a phenotypic one, between these early breeders and the later ones.

Whether they are being fed a lot or a little, they obviously are more suited to their environment and management conditions. The difference is inherent.

We need to face the fact that we have made cattle extremely unsuited for range conditions by breeding seed stock for feedlot production as essentially a single-trait selection criteria. This was a flawed idea whose time to die has come, along with the "lean and efficient" concept. Cows and bulls that can put on some fat and carry it into the winter will produce calves that can get fat easily and finish early, especially in

a feedlot environment.

Moreover, this reiterates the claim by African rancher-consultant Johann Zietsman that reproduction is a survival trait and therefore is highly heritable.

For a reference from nature, several years back I spent quite a few winter days culling whitetail deer does and butchering them with a friend in the Texas Panhandle. I remember two important facts from this exercise. Regardless of the conditions, drought or no drought, even if the does seemed a little thin in appearance, I can't recall ever butchering one that wasn't reasonably fat or one that was not pregnant. And we aged them from yearlings to more than 9 years old. They were simply suited to survive and reproduce in their habitat.

I believe this is what we need to recapture in our cattle. The right kind of animals, the ones that show high capacity for reproduction, are the only kind of cattle we need.

Comments? Send email to alan.newport@farmprogress.com.

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Reproduction is a survival trait and therefore is highly heritable.

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Take narrow road for lasting horn fly control

The horn fly, one of the biggest seasonal problems for the U.S. beef industry, has a chemical-free and viable solution, but there is little evidence anything is being done to move that direction.

That solution is selecting cattle for genetic resistance. Scientific and demonstrative evidence says this is true.

However, we searched for “bulls for sale fly resistance” using the Google, Duck Duck Go and Bing search engines.

Our internet search found two seed-stock operations in Australia that advertise breeding for “buffalo fly” resistance and one in the U.S. that mentions selection for fly and internal parasite resistance in its cattle — Pharo Cattle Co.

We happened to know of one more, Steven Lukefahr in deep southern Texas, who selects for “internal and external parasite” resistance but whose website did not show up in the search. We suspect there are others, but could not find them. Also, some breeds claim great parasite resistance, but still have significant differences between individuals.

We also found information that said USDA had made a grant for research on an “anti-feeding vaccine” for horn flies.

However, there is viable research — now quite a few years old — that shows some cattle have much greater natural resistance to horn flies, just as has been shown for tick resistance here and on other continents. Some have it, and some don't.

Dayton Steelman, emeritus professor of veterinary entomology with the University of Arkansas-Fayetteville, found in his years of research that resistance to horn flies is much different among individual cattle in particular. He also learned that resistance is highly heritable among cattle.

Steelman traded emails with Beef Producer over this topic several months ago. He said he went to work as a researcher at the University of Arkansas in the early 1980s. The university had a herd of old-type Angus cattle that had been bred and selected into four groups, stratified by hip height. The shortest averaged about 46 inches. The tallest averaged just more than 50 inches.

“I collected horn fly population data on over 400 Angus cows at the University of Arkansas and USDA Center at Boonville on a weekly basis for 14-16 weeks, each of four years, specifically on each cow,” Steelman said. “The cattle received no insecticide treatments during this time. We used these data to calculate the heritability and repeatability. There was a statistically significant difference in horn fly numbers among the four size groups at the University of

Arkansas and the group in Boonville. The data showed that as the Angus cattle

were selected for greater frame size ... had significantly greater numbers of horn flies.”

Steelman said they later added Charolais, Chianina, Red Poll, polled and horned Hereford cows to the study and database. He said the different breeds had statistically significant variations in fly resistance, but they also found statistically significant differences among individuals within each of the breeds. Steelman said they analyzed all the data and came up with an impressive heritability estimate of 0.58, or 58%, for horn fly resistance.

He added that researchers studying cattle ticks in South Africa and Australia estimated greater than 80% heritability for tick resistance. He said the Africans continued using their data to develop a cattle breed that was tick resistant.

Steelman also said he saw Canadian re-search on the relationship between hairs per square centimeter and cattle size. He says the study showed him the larger cattle had about the same number of hairs as the smaller cattle, and according to the Canadian researcher's data, all cattle within a breed



PHOTO COURTESY OF CRAIG SHEPPARD, UNIVERSITY OF GEORGIA, BUGWOOD.ORG

have about the same number of hairs at birth. Breeding them bigger just spreads the hairs out, he said it appears.

Steelman then did a study and found that of all the breeds available then, pure-bred Brahman cattle had the highest number of

hairs per square centimeter. Chianina were close behind, but the fact remained that hair numbers per square centimeter became less

See **Horn fly**, Page 27B



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Horn fly • from page 26B

within each breed as the cattle were selected for larger frame size.

For further knowledge, Steelman then washed the animals with hexane and found the compounds being secreted by the two sebaceous glands and one sweat gland associated with each individual hair had an effect on fly attraction or repellency. The more hairs the animal had, the more glands in the skin to secrete these compounds, he learned. He said further cooperative breeding work with USDA Meat Animal Research Center at Clay Center, Neb., showed him and the others could breed highly horn fly resistant cattle, many of them of very large size, Steelman added.

In fact, the two U.S. producers that Beef Producer corresponded with both say they have had good success breeding for genetic parasite control.

Lukefahr says he has selected for fly resistance for many years in breeding a heat-resistant line of cattle he calls STAR (Senepol, Tuli, and Angus Red cross).

“My STAR cattle with slick hides and lighter colors (lighter than red) attract very few flies,” he says. “Of course, there are other genetic factors involved, but these two traits undoubtedly have a major influence.”

Kit Pharo says his selections have been quite successful and that he has used no paratocides now for many generations. Further, he ranks his bulls for fly resistance in all sales materials.

African rancher and consultant Johann Zietsman often talks of parasite resistance as an important part of overall adaptability and reproductive efficiency for cattle. He grew up on a ranch in Zimbabwe in a culture where plunge-dipping of animals was considered the primary solution for tick problems. Eventually he came to realize natural immunity to all parasites was a more effective and profitable plan.

In his book, “Man, Cattle and Veld,” Zietsman summarized this line of thinking: “The problem of ticks and internal parasites is not going to be solved with poisons. Dipping and dosing make cattle more susceptible to parasites and dependent on the continued use of poison.

“In addition, beneficial organisms such as dung beetles and oxpeckers are killed whilst creating populations of chemical resistant parasites. The only lasting solution is dependent on the breeding of parasite resistant cattle and not poison-resistant parasites.”

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